THE AUSTRALIAN PLANT DISEASE RECORDER.

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PLANT DISEASE NOTES.

CEREALS AND GRASSES.

HORMONE WEEDICIDE ON WHEAT:

Wheat showing abnormalities due to excess hormone weedicide was recently examined at Temora Experiment Farm, in an experiment conducted by Mr. R. Russell of the Dept. of Agriculture.

The recommended spray is for 3 oz. - 1 lb. to the acre of the sodium salt or amine of 2,4 D sprayed not sooner than the 6" high stage. In this experiment 1 lb. per acre of the ethyl ester was sprayed at the 3rd leaf stage. The crop was sown on the 5th June, and a strip of 20' x 30 chains was sprayed on 4th July. When examined by Mr. Russell on 7th August, the sprayed strip looked about 2 weeks in growth behind the unsprayed crop on either side. Later the sprayed strip took on an "onion-plant" appearance, i.e., leaves rolled, and a "variegated" appearance, due to white stripes on many leaves.

The crop was examined by the writer on 23rd October, when both sections were in head, with many flowers just setting. The height of the unsprayed crop at the time was approx. 3'7", and no malformation was detected. The sprayed crop was shorter, with many plants showing abnormalities; 14 distorted plants picked at random averaged only 1'10" in height. Leaves with undistorted laminae were bluey-green and longer and wider than the controls.

Very briefly, the main abnormalities were as follows:

Leaves. "Variegations" were caused by prominent longitudinal white ridges running the length of the blades. In sections these were seen to be due to an increase in sclerenchyma on the abaxial side of the major bundles, and to a small extent, the minor bundles. The amount of assimilating tissue in the rolled leaves was reduced, and a layer of sclerenchyma occurred under the adaxial (or inner) epidermis, broken only where a little assimilating tissue occurred below stomates. The motor cells had also lost their identity. In some cases the leaves formed a complete cylinder, the sheath only being split to allow the escape of the main axis. In many of these cases the split was not sufficient, and ears were caught in the sheath. In other cases, no angle occurred between the sheath and blade, the whole structure being continuous, the position of the angle being marked by a band of white, slightly raised tissue encircling the rolled leaf. When split, a membrane, in the form of a cone, projected into the cavity of the cylinder, this being the ligule, and perhaps the auricles.

Stems. The distortions included acute angles at the nodes, bending of internodes, thickening and flattening of internodes. Sections mainly showed an increase in the hypoderm and ground parenchyma.

Rachis and head. Awn production was slightly irregular, acute angles occurring between the nodes, and double heads and supernumerary spikelets were also noted.

A little loose smut occurred in both the sprayed and unsprayed wheat, but the incidence of Septoria tritici was greater in the sprayed strip. This appeared to be due to water being held in the distortions of the leaves and stems, allowing greater opportunity for germination and penetration of spores.

Faculty of Agriculture,
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- DOROTHY E. SHAW.

RICE DISEASES IN AUSTRALIA:

Earlier this year rice plants from the Ord River district of Western Australia were received from Dr. T.H. Harrison. They were found to be bearing numerous elongated sori of the leaf smut Entyloma oryzae.

This would appear to be the third record of a disease of a pathogenic nature on rice in Australia, but fortunately it is a disease which is apparently of little consequence.

Previous records are Piricularia oryzae in experimental plots in Queensland (McKnight, A.P.D.R. 2:2:13, 1950) and Sclerospora macrospora in the Murrumbidgee Irrigation Area. Watts Padwick (Kew, 1950) takes Brizi's view that the fungus causing downy mildew of rice is S. oryzae, which is restricted to this host and is morphologically distinct from S. macrospora. If this is the case, it seems probable that the local fungus is S. oryzae.

Numerous other fungi were detected on the Western Australian plants, the most common being Curvularia spp., most of which could be placed in either C. lunata or C. maculans. Several isolates were tested for pathogenicity and found to produce weak reactions on Wong Ghin rice seedlings. It is considered that they are of little pathogenic significance.

Other fungi identified were Nigrospora oryzae, a small-spored Helminthosporium sp., Hormodendrum sp. and Alternaria sp. Inoculations with these fungi failed to produce reactions on Caloro II or Wong Chin seedlings.

The isolates of Nigrospora oryzae varied considerably in spore diameter and no germination of the spores was obtained in tap water.

Other conditions of rice which have been recorded in the M.I.A. include a blackening of the glumes in 1928 by Cladosporium sp. and Alternaria sp. following insect injury, a blasting of the heads and liberation of starch grains in 1928, and a glume discoloration and spikelet sterility in 1931, thought to be caused by frost or hot winds at heading time.

This year another specimen was received from Leeton which showed a head blasting and starch grain liberation apparently identical with that recorded before. The only organisms found on the affected heads were a Cladosporium sp. and an Alternaria sp. The cause of the condition is unknown.

Department of Agriculture,
Sydney.

- P. G. VALDER.

FUNGI DETECTED ON IMPORTED RICE:

Seed rice imported into N.S.W. this year from Hong Kong and Sikkim was found, by plating the grain onto P.D.A., to be carrying Helminthosporium oryzae. Inoculations produced lesions on the leaves of Wong Chin rice and Federation wheat seedlings, while the reaction was very faint on Caloro II rice.

The spores produced on rice seedlings were typical of H. oryzae as described by Drechsler (J. Agr. Res. 24: 641-740, 1923), Watts Padwick (Kew, 1950) and others, showing a tendency towards a rather distinct attenuation at the apex and less at the base, with consequently a maximum width about one third of the distance from the base. In culture, however, the spores produced were very variable and not characteristic.

The most common fungi isolated were Curvularia spp., most being close to C. lunata or C. trifolii, although those isolates showing a percentage of four septate spores were hard to place. The pathogenicity of several isolates was tested, the results being similar to those obtained with the Western Australian isolates (see preceding article).

Other organisms isolated were Chaetomium spp., Nigrospora oryzae, Hormodendrum sp., Alternaria sp. and bacteria.

Fungi previously detected on rice imported into New South Wales include Helminthosporium oryzae, Ustilaginoidea virens, Phoma sp., Fusarium sp., Penicillium sp. and Alternaria sp.

Department of Agriculture,
Sydney.

- P. G. VALDER.

GRASS SMUTS:

While collecting leaf blights and spots of grasses, the writer has come across a few interesting smuts, material of which has been forwarded to R. F. Langdon for his collection.

In 1949, plants of Poa pratensis were found in the grounds of Sydney University, with a leaf smut. The chlamydospores are 9-12μ (aver. 10μ), yellow-brown, mainly spherical, and echinulate, and conform to Ustilago striiformis (Westend.) Niessl — the validity of the name has been questioned by Stevenson (Pl. Dis. Reptr. 30:53, 1946) and Ainsworth and Sampson (Kew 1950) although its retention is recommended — or U. striiformis forma Poae - pratensis according to Davis (Phytopath. 25:810 - 817, 1935). As far as can be determined from published lists, this organism has not been recorded on this host in Australia. The smutted plants were transplanted into pots, and the disease has since been maintained in the glasshouse. Spores collected in July, 1950, tested immediately and following after-ripening periods failed to germinate in water or dung infusion. Kreitlow (Phytopath. 33: 1055-1063, 1943) has suggested that the temperatures operating during the maturation of the spores probably account for the differences in germinability recorded by many workers with this stripe smut.

In August 1950 plants of Liverpool Plains Grass (Stipa aristiglumis) were collected in the north-west of N.S.W., the stems of which had the appearance of twisted, teased-out rope. Several collections have been made since, including one of a small species of Stipa, probably S. variabilis. The smut, which could not be detected macroscopically consisted of yellow-orange spore balls composed of 5-15 spores permanently united. The spore balls are 18-28 x 20-38μ, and the spores approx. 8-10μ. Germination was obtained in water after 4-6 days. Up to 5 promycelia were noted from individual spore balls, although 1 or 2 were the most usual. The promycelia were short (12-16μ long and 2μ wide), septate, and in some cases produced thin branches.

As far as can be traced, this smut has not been recorded. It is being tentatively called "Ropey Smut", and appears to be a Tolysporium. The spore balls are too permanent for a Sorosporium, and although light-coloured, are not marked on their free surface as is usually the case with Thecaphora, which also has not been recorded on the Gramineae. The identification is being discussed with the C.M.I.

Specimens of Stipa aristiglumis were recently received from the north-west of N.S.W., with a stem smut of the Ustilago hypodytes complex (Fischer and Hirschhorn, Mycologia 37: 236-266, 1945). Rather conflicting germination results have been given for this group. Spores from this collection germinated readily in water, producing septate promycelia with lateral and terminal ellipsoidal sporidia, approx. 1-1.5 μ in length, in a few days. The spores are without hyaline bipolar areas.

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- DOROTHY E. SHAW.

FIELD AND FODDER CROPS.

WITHERTOP OF LINSEED:

Towards the end of September 1950 the following conditions were observed affecting linseed crops on the Murrumbidgee Irrigation Area, which were just running up to flower. The stem just beneath the inflorescence collapsed, lost rigidity and fell over. Subsequently the affected flower head withered and browned off. When first observed scattered brown heads were obvious in some of the crops. Some ten days later these crops were past their peak flowering and the condition was less noticeable. It was estimated that less than 5% of the crop was affected.

These symptoms agree closely with those described by Millikan for Withertop in Flax (Dept. Agric. Victoria, Tech. Bull. No. 9, 1951). Also Millikan found special conditions favouring the development of this disease. He has found it to be due to a calcium deficiency and that withertop is definitely increased by waterlogging of the soil. Further he stated that the effect was greatest when the plant was 12 to 15 inches or more in height, undergoing rapid elongation.

Just these conditions appear to be associated with the appearance of the disease on the M.I.A. Between 21st and 27th September two inches of rain fell. The withertop plants were to be found more abundantly in any slight depressions which appeared

to remain wet for some time. Though the condition was general throughout the Area there was a variation from block to block but not necessarily associated with any specific soil type.

The significant fact is that soils which were high in calcium in their virgin state and which were definitely alkaline are becoming quite acid under irrigation practice. Some extremely acid soils have been located on horticultural blocks and a few farmers have experienced excellent pasture response to liming.

Department of Agriculture,
Leeton, N.S.W.

- J. R. MORSCHEL.

VEGETABLES.

PURPLE TOP WILT OF POTATOES:

Norris (A.P.D.R. 2:2:14-15, 1950) has recorded the occurrence of the big bud virus on potatoes in the Canberra region.

Recent inspections of potato crops in the Grafton and Wellington districts of New South Wales have shown that a disease closely resembling purple top wilt as described by Leach and Bishop (W. Va. Univ. A.E.S. Bull. 326, 1946) is occurring in these areas this season. The result of budding onto tomatoes from specimens from Grafton showed that infection by the big bud virus had occurred on potatoes in this area. Results of budding from the affected plants from Wellington are not yet available but the condition of the plants was identical with those from Grafton.

Infection in crops at Grafton was of the order of 2% at most, often being less than 1%. However, at Wellington, one crop showed about 50% infection and others were showing 10 - 20% infection. It was established that yellowing and purpling of the tops of affected plants at Wellington had occurred about 13 weeks after planting.

Individual potato specimens showing this disease have also been received from growers in other parts of the State recently, indicating that the disease is generally distributed through the crops this season.

Department of Agriculture,
Sydney.

- R. J. CONROY.

BEAN MOSAIC:

Very dry conditions in most of New South Wales during the period September to November, 1951, were accompanied by severe infestations of aphids in bean crops, following which most bean crops planted between early September and early November developed symptoms of mosaic. The degree of aphid infestation and subsequent mosaic infection do not appear to have been as great, however, as in the spring of 1948.

More than one virus may be involved, but, on the basis of field symptoms and on recent glasshouse inoculations by leaf rubbing with sap from affected plants collected in the field, it is thought that the main virus concerned is a strain of yellow bean mosaic (bean virus 2), similar to that recorded by Stubbs (A.P.D.R. 1: 2: 19-21, 1949) in Victoria. Symptoms include a distinctive leaf mottling in the case of dwarf varieties such as Tweed Wonder, Brown Beauty, Clarendon Wonder and Refugee 5. The last-mentioned variety is reported to be resistant to common bean mosaic (bean virus 1) and has frequently been used in the United States to differentiate between common bean mosaic and yellow bean mosaic. On the climbers Epicure, Blue Lake, Kentucky Wonder and Alabama No. 1 a top necrosis is produced which is sometimes followed by the complete death of the plant. These top necrosis symptoms on climbing varieties have been observed in the field and also produced in the glasshouse.

Field observations over a number of years suggest that most of the mosaic-like symptoms which occur in crops of dwarf French bean varieties in New South Wales are those of the non-seed-transmitted yellow bean mosaic rather than those of the seed-transmitted common bean mosaic.

Department of Agriculture,
Sydney.

- R. D. WILSON.

FALSE CLUB ROOT OF CRUCIFERS:

The false club root of crucifers referred to by Pittman (A.P.D.R. 3:2:23, 1951) appeared recently in a crop of cabbages in Southern Tasmania. On the root of the specimen submitted for examination the crown-gall-like swellings, containing chlorophyll, were evident. These nodules were largest just below ground level. Hand sections of some smaller nodules lower down the root revealed the presence of what are apparently zoosporangia of the fungus Olpidium brassicae.

As far as is known this is the only record of this disease in Tasmania. Unfortunately, attempts to secure more material for examination were unsuccessful as the grower had destroyed all affected plants.

Department of Agriculture,
Hobart. - E. GWENDA WINGRAVE.

ONION DISEASES IN NEW SOUTH WALES DURING THE CURRENT SEASON:

The most noteworthy record was the occurrence of onion bloat (Anguillulina dipsaci) in a crop at Tenterfield. The only previous record of bloat in this State was made in 1947 when it occurred on three farms in the Maitland district. The growers concerned have subsequently refrained from planting onions in the infested areas.

During this season downy mildew (Perenospora destructor) has been prevalent and there have been a few records of white rot (Sclerotium cepivorum).

Department of Agriculture,
Sydney. - R. J. CONROY.

CROWN GALL OF RHUBARB:

Specimens of rhubarb roots received in October from the Sydney Metropolitan Area showed swellings suggestive of crown gall (Agrobacterium tumefaciens). As this disease had not previously been recorded on rhubarb in New South Wales, cross inoculations were made from rhubarb to tomato. Within three weeks swellings typical of crown gall were present on the inoculated tomato plants.

Department of Agriculture,
Sydney.

- R. J. CONROY.

RHUBARB RUST:

Rhubarb rust is recorded in Australia as Puccinia rubella. This is a synonym of P. phragmitis which has its uredospore and teleutospore stages on Phragmites communis. The aecial stage produces striking red spots on Rheum spp. and Rumex spp. However, this rust has not been recognised on P. communis here, although of course it may be present.

Examination of fresh and herbarium specimens of rhubarb rust collected in the Sydney Metropolitan Area has shown that uredospores only are present. It is clear, then, that the rust commonly found in this region is not P. phragmitis. The only other rust recorded on rhubarb is P. rhei-undulati, which is described from Japan and New Zealand. Cunningham (Trans. Roy. Soc. N.Z. 75: 324-327, 1945) describes the uredospore stage in New Zealand. The uredospore stage occurring locally agrees with this and specimens sent to the C.M.I. were identified by Dr. Bisby as P. rhei-undulati.

It would be interesting to hear of any collections of the teleutospore stage in Australia as this would verify the identification.

Brittlebank records, besides P. phragmitis, a Puccinia sp. on rhubarb, and this may well be the same fungus as that occurring in New South Wales.

Department of Agriculture,
Sydney.

- P. G. VALDER.

FRUIT.

FRECKLE OF APRICOTS:

During the recent wet seasons the diseases freckle (Cladosporium carpophilum) and rust (Puccinia pruni-spinosae) have become important problems in the early apricot industry in coastal districts of New South Wales. This season an experiment was set up in a block of Glengarry apricots at Glenorie near Sydney, in an endeavour to gather preliminary data concerning the control of these diseases.

Rust infection has not yet occurred, but excellent control of freckle was secured with Thiotox, 1½ lb./100 gal., (0.12% T.M.T.D. spray) and Vitospor-FX, 3 lb./100 gal., (0.15% spray of ferric dimethyl dithiocarbamate), with no unfavourable tree reaction. On the unsprayed trees all fruit was heavily infected, whereas the fruit from the eight trees sprayed with Thiotox appeared to be entirely free of freckle lesions, and very few were detected on fruit from the Vitospor-FX tree. This slight difference was probably due to the fact that the latter tree was sprayed by means of a stirrup pump, whereas the Thiotox trees were sprayed from a power outfit.

All sprayed plots received a copper oxychloride spray (Cuprox at 5 lb./100 gal., plus 2 fl. oz. Wetsit) at budswell on 18.7.1951. The various treatments were then applied at 70% petal fall (14.8.51), advanced shuck-fall (4.9.51) and in two cover sprays (9.10.51 and 6.11.51). The fruit was harvested in mid-November.

Weak Bordeaux mixture 2-2-100 + ½ and Cuprox 1 lb/100 gal. caused considerable injury to those portions of leaves which were exposed at the time of the petal-fall spray. SR-406 4 lb./100 gal., (0.2% spray of N-trichloro-methylthiotetrahydrophthalimide) caused extensive injury to leaves and fruit following the shuck-fall spray. These three treatments were discontinued at the above stages. Neither of the copper treatments appeared to have afforded any appreciable degree of control, nor had the budswell spray alone, but the single tree sprayed until shuck-fall with SR-406 showed much less infection.

Department of Agriculture,
Sydney.

– K. E. HUTTON.

BOTRYTIS CINEREA ON RASPBERRIES:

In may 1951 some raspberry bushes were found at Cygnet (Tasmania) which had black sclerotia protruding from the split bark on some of the canes. No fructifications were associated with the lesions.

Re-inspection of the area in November revealed that some of this season's fruiting canes were showing infection with Botrytis cinerea. This appears to be the spore stage of the fungus whose sclerotia were present on the canes during the winter.

This fungus has not previously been noticed on raspberry canes in Tasmania.

Department of Agriculture,
Hobart.

- E. GWENDA WINGRAVE.

MISCELLANEOUS NOTES.

THE USE OF CASEIN AGAR TO ELIMINATE BACTERIAL CONTAMINATION:

A method of eliminating bacterial contamination from fungal cultures was reported in A.P.D.R. 3 : 2 : 28-29, 1951. A supplementary or alternative method is described here.

The crystal violet - P.D.A. is replaced by 2% tap water agar to which 0.25% casein is added. The casein is conveniently dissolved in 0.7% K_2HPO_4 as a 5% solution.

The medium consists of:-

5% Casein, 50 mls.
Agar, 20 grs.
TapWater, 950 mls.,

autoclaved for 20 minutes at 15 lbs. pressure.

Inoculation and transfer techniques are as described previously, except that the contaminated culture is passaged twice through casein agar and then to P.D.A.

It has been the writers' experience that, with contamination by motile bacteria, crystal violet medium is superior since casein agar does not prevent rapid spread away from the point of inoculation. With non-motile contaminants casein agar is more satisfactory as it does not affect appreciably fungal growth rates, while bacteria are confined to the inoculation site. To date no bacterial contaminant has been encountered which could not be eliminated by one or a combination of these methods.

Casein agar is used in these laboratories as a routine for obtaining soil actinomycetes free from associated bacteria. In the few instances where direct isolation is not possible, the medium is effective in a streak plate series.

C.S.I.R.O.
Canberra.

- J. BROCKWELL & JANET N. FRIEND.

ERRATUM:

In the last line of the fourth paragraph of the article "Ripe Spot of Sturmer Apples", A.P.D.R. 3:4:50, 1951, the word "prepink" should read "prepick".

- EDITOR.

COMMONWEALTH MYCOLOGICAL INSTITUTE NOTES.

F.A.O. AND C.A.B. SERVICES:

This matter was referred to in the two preceding numbers of A.P.D.R. It is noted that the relevant portion of the draft of the International Plant Protection Convention has now been amended to read as follows: "Each contracting Government agrees to co-operate with F.A.O. in the establishment of a World Reporting Service on plant diseases and pests, making full use of the facilities and services of existing organisations for this purpose, and, when this is established, to furnish to F.A.O. periodically the following information:- (i) reports on the occurrence, outbreak and spread of economically important pests and diseases of plants and plant products which may be of immediate or potential danger; (ii) information on means found to be effective in controlling the pests and diseases of plants and plant products".

This is interpreted by the writer to mean that nations of the British Commonwealth would use the facilities and services of the Commonwealth Mycological Institute and Commonwealth Institute of Entomology in assisting in the establishment of a World Reporting Service on plant diseases and pests.

SALE OF C.A.B. PUBLICATIONS IN AUSTRALIA:

A review has been prepared by Mr. W. Ives, C.A.B. Liaison Officer, of sales of C.A.B. publications in Australia for the year ending 30/6/1951. A total of 510 publications were sold, valued at £299. The sales of publications of the Commonwealth Mycological Institute were few, raising the question whether full advantage is being taken of these publications in Australia. The sales were as follow:- "The British Smut Fungi", 2; "A Manual of Rice Diseases", 1; "Bibliography of Systematic Mycology, 1948", 1.

VISIT OF MR. J.E. CUMMINS:

In a personal communication, Mr. J.E. Cummins, Australian Chief Scientific Liaison Officer in London, and Chairman of C.A.B. Executive Council has indicated that he may be visiting Australia for a brief period in February, 1952.

- C. J. MAGEE.